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BULLETIN No. 31

Government of the Province of Saskatchewan
DEPARTMENT OF AGRICULTURE

**FARM WEEDS AND HOW
TO CONTROL THEM**

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Explanation and Acknowledgments

The illustrations in this bulletin are the same as appeared in Bulletin No. 7; the small figures being duplicates of those used in Britton and Brown's Flora, by permission of the proprietors of that work. A number have appeared in bulletins of the Ontario Agricultural College, the Central Experimental Farm, the Dominion Department of Agriculture book "Farm Weeds," and Bulletin No. 2 of the Manitoba Agricultural College, Winnipeg, while shepherd's purse, tansy mustard and blue burr are from drawings by Norman Criddle, of Aweme, Man. To all of these institutions, firms and persons we wish to acknowledge our indebtedness. Many of the descriptions of weeds are those employed by Prof. T. N. Willing in Bulletin No. 7, and for these and other matter we are indebted to him.

Brief directions are given for preventing injury to crops by insects, gophers, smut and potato scab.

Noxious Weeds

Section 2 of The Noxious Weeds Act provides in part as follows:
In this Act unless the context otherwise requires the expression:

1. "Noxious weeds" shall include the following weeds and such other weeds as may be declared by the minister by order made public in *The Saskatchewan Gazette* to be noxious:

CANADA THISTLE.

PERENNIAL SOW THISTLE.

WILD OATS.

STINKWEED.

WILD MUSTARD.

HARE'S EAR MUSTARD.

TUMBLING MUSTARD.

BALL MUSTARD.

RUSSIAN THISTLE.

FALSE FLAX.

PURPLE COCKLE.

COCKLE.

WEED.

BIRD RAPE.

BLUE BURR.

NIGHT FLOWERING CATCHFLY.

TANSY MUSTARD.

WORMSEED MUSTARD.

SHEPHERD'S PURSE.

SOW CLEAN SEED

SOW CLEAN SEED**Explanation of Terms used in the Text**

WEED.—Any plant that persistently grows where it is not wanted.

PERENNIALS.—Those plants that continue to grow for many years from the same root system. They produce seeds each year just as annuals do.

BIENNIALS.—Plants that grow for two years. The first year most of the energy of the plant is devoted to the development of the root and in the second year the flowering stems and seeds are produced.

ANNUALS.—Plants that complete their life history in one season.

WINTER ANNUALS.—These are true annuals but are sometimes biennial in habit in that should seeds of these plants germinate in the fall the young plants are sufficiently hardy to live through the winter and complete their growth during the following spring.

ROOTSTOCK.—A creeping stem below the surface of the ground.

TAPROOT.—Generally a deep root which is the prolongation downward of the main stem.

NOXIOUS WEEDS.—Weeds that require more than ordinary care and methods to keep them under control.

LUCK.—The only way some farmers are able to account for the success of their neighbours.

CONTROLLING WEEDS.—Keeping them down sufficiently to prevent their reducing the yearly yields of grain per acre.

WEED CONTROL.

In dealing with the control of weeds the writer is well aware that the methods outlined and the statements made are not applicable to *every* condition met with in the province. Each farm requires particular treatment and often the system must be modified because of the variation of the seasons. But every farmer should learn the general principles underlying weed control and soil cultivation, and so modify or adapt these that they will apply to his own farm. If we are not capable of doing this then we have missed our vocation. Weeds wait on no man, college professor, weed inspector or truck farmer.

It might be well to state that the magnitude of the weed problem is due, not to the aggressiveness of weeds so much as to the carelessness of man.

The main problem is to so keep weeds under control that the amount grown on any farm each year does not materially affect the year's production of crops. Following are a few suggestions that will aid in keeping weeds under control:

1. Fence the farm as soon as practicable. Keep your own stock at home, keep your neighbour's stock away and prevent the making of trails across your fields.
 2. Every farmer in the West has at least a few acres of clean land for seed production. Sow only clean seed on that lot and go over that field several times during the summer and make sure that there are no stray weeds. A safer and saner investment of time would be hard to find.
 3. Be careful of the feed you give your stock. Crush weed infested grain if possible and if there are weeds in the rough feed, do not spread the manure on the field until it has become well rotted.
 4. Keep all roads, fence corners and waste places free from weeds. There is very little sense in having around the outside of a well cultivated field a fringe of, say, Russian thistle, tumbling mustard or Canada thistle.
 5. Get acquainted with the weeds. Learn to know them by their manner of growth, by the nature of their seed or by a few pieces of the plant if found in some fodder or straw. Get to know the weeds, no matter in what form they may come before you.
 6. Be always on the watch. Many a farm today would be worth double its present value if the owner had stepped across and pulled those first few weeds. It is not the first weed that does the damage but being neglected through want of information or carelessness, the seed of that plant gives many thousands of plants for the next year. A single tumbling mustard seed is capable of producing a million and a half of seeds.
- Plan the farm work to make it possible to do fall cultivation. It is not so much the weeds you will kill in the fall, but more the fact that conditions are thereby made right for germination in the spring. At no other time of the year is it possible to germinate so large a number of weed seeds; in fact that is about the only time of the year in which it is possible to germinate the weed seeds in the top inch of soil.

WAYS OF SPREADING OF WEEDS.

Although weeds may spread by a great many different agencies fully 90 per cent. of the weeds that first blossom in a man's field get there through the seed he has sown. It is practically impossible to clean all weed seeds out of seed grain, no matter how new or complicated may be the machinery we are using. Suppose there remains but one seed in a bushel of grain and that amount is sown on an acre of land, on every acre we have one weed. To the ordinary observer this may not seem a serious matter, but to the agriculturist who thinks, it is cause for immediate action, and if we do a little calculating it is readily seen just how dangerous is even one weed per acre. Suppose that one weed is wild mustard, an average plant of which will produce in a season about 15,000 seeds. Perhaps half of these will shell out before the grain is harvested and the remainder go into the grain. If your field gave an average yield of 20 bushels per acre, in this crop there are about 375 wild mustard seeds to every bushel of grain. Not a large percentage but a good start. This however is by no means the worst feature. Out in the field, in a little spot perhaps not more than a yard square are 7,500 wild mustard seeds, each capable of producing seeds like unto itself. The following year we find in this place a bad patch of mustard, and more than this probably a great number of the seeds have not germinated the first year and may remain in the ground several years before they start to grow.

Of the other 10 per cent. of the weeds that first blossom in a man's field probably the majority find their way there through carelessness and thoughtlessness in the handling of feed grain, screenings, fodder, straw, etc. Three instances that have been noticed will serve to point out very clearly the truth of the above statement. A sample of oats was taken from a gallon measure just as a man was feeding his horses one noonday in August. At this particular time he was working on a piece of backsetting. A tea-cupful of these oats was examined and found to contain the following seeds: 1,720 tumbling mustard, 123 wormseed mustard, 100 hare's ear mustard, 16 buckwheat, 14 Russian pigweed, 11 gumweed, 2 ball mustard, 1 chess and 1 corn cockle. All of these in a half pint of seed! When we remember that the vitality of weed seeds is not affected by passing through the digestive system of a horse it requires no vivid imagination to realise the extent of the spread of weeds by this means. A second instance of how weeds are spread was noticed one windy day last fall. A farmer was hauling into town, a distance of 9 miles from his home, green oat fodder to supply a livery barn. Along the trail where he had passed were picked up stalks of stinkweed and wild oats, and in an examination of the load there were found ball mustard, false flax and Canada thistle, as well as the weeds mentioned above. It might be well to add also that in a handful of the oats used for feed in this particular livery barn there were counted 1 wild mustard seed, 1 stinkweed, 3 wild oats, 21 false flax, 71 hare's ear mustard.

Other agencies are: winds, birds, water and farm machinery, but it must be remembered that the few weeds brought to a clean farm by those methods do little damage. It is the fact that no attention is paid to these few that does the harm. If the man who found that he had one wild mustard plant to the acre had pulled that one he would have had no

mustard problem the next year. A weed pulled in time means a clean farm, and if clean seed is sown every year and our farms are fenced, a farm may be kept comparatively clean for many years.

It is readily seen how useless it is to sow clean land with dirty seed. Nothing is ever accomplished this way in the matter of weed eradication. It might be fitting to say right here that the easiest way to get clean seed the cheapest and most reliable is to go each year through the field and pull all the weeds out of enough acres of crop to yield the seed required for next year's crop. In most cases it would require less than half a day to clean next year's seed of all weeds in this way. What more simple method does civilised man want? Too often, however, it is not want of better methods that is the trouble but lack of sufficient application to live up to the light we have, and in such cases well meant advice is superfluous.

INJURIOUS EFFECTS OF WEEDS.

1. *Waste Soil Moisture.*—Tumbling mustard is said to require twice as much moisture as does wheat. If this is so it follows that a field infected to the extent of one-third with this weed will only yield one-half the crop it would otherwise produce.

2. *Waste Plant Food.*—All plants whether useful or ornamental, or neither, draw upon the soil for practically the same elements of plant food. A useless plant in a grain field, then, wastes plant food as well as occupies valuable ground where a beneficial plant would have grown.

3. *Reduce Market Value of Crops.*—The following from the market review of the Manitoba Free Press for three days of the latter part of October, 1912, shows quite plainly the loss to the West due to weeds:

Cars Inspected	Rejected for Weeds	Date	Cash quotations for	
			No. 1	No. 1 rejected
1,053	51	October 25, 1912	90	84
717	35	October 29, 1912	88	83
944	46	October 28, 1912	88	84

This represents a direct cash loss of \$7,490 to the growers of less than 3,000,000 bushels of wheat in these cars, to say nothing of a freight bill of about \$1,200 on the weeds.

Of the cars inspected for those three days 5 per cent. were graded rejected because of weeds. The above market quotations show that the difference between No. 1 Northern and No. 1 rejected for weeds is from 4 to 6 cents per bushel.

CANADA THISTLE—*Arsium Arvense*, L. Scop.

OTHER ENGLISH NAMES.—Creeping thistle, field thistle.

A deep rooted perennial. Introduced from Europe; has creeping rootstocks which are capable of sending up a great number of shoots. Its rootstock has been found running along in the ground 15 inches below the surface and sending up new shoots every 5 or 6 inches. Commonly grows to a height of 2 to 4 feet. Leaves rather narrow, crinkled, prickly, slightly clasping the stem at the base, upper surface smooth, dull green, under surface slightly downy and grayish in colour. Some plants bear male flowers only and produce no seeds; others female flowers only, which produce many seeds. The flower heads of the male plant are nearly globe shaped about 1 inch across, lilac and violet in colour, while those of the female are oblong and only half the size, apparently not coming fully into flower. The flower heads on the male plant are more conspicuous and more numerous than on the female plant. Large patches may be found bearing male flowers only, showing that all the plants originated from a single seed and that the patch was formed from the underground rootstocks. An average female plant is capable of producing about 2,500 seeds.

Seeds are about one-eighth of an inch long, light brown to gray, oblong, smooth and somewhat flattened and curved; the top end of the seed is nearly round, flat, and has a narrow rim with a small cone shaped projection in the centre. Attached to the top is a conspicuous tuft of hair or down, which makes it possible for the wind to carry the seed long distances. The tuft of hair of course will be absent in seed grain, having been broken off by threshing and handling. Canada thistle is spreading very rapidly and small patches may be found in most sections of the province. The worst sections at present are along the main line of the Canadian Pacific Railway from Moose Jaw district to Wolseley.

Canada thistle is quite commonly mistaken for prairie bull thistle by those unfamiliar with the two weeds. The latter is white and woolly throughout; the root system is shallow, and the flowers are from 1½ to 2½ inches across. However the department would advise any one in doubt as to either plant to send a specimen to Professor Willing, College of Agriculture, Saskatoon, or to The Weeds Commissioner, Department of Agriculture, Regina.

SUGGESTIONS FOR CONTROL.—Several methods are recommended, the merit of each depending on the extent of area infested and the kind of soil.

1. Where patches are very small, probably the most economical way is to cover with manure and leave covered the entire summer. The covering must extend 4 or 5 feet beyond the boundary of the patch and be at least 3 feet deep.

2. When there is a large quantity of thistle and no other weeds are present, it sometimes is advisable to leave them alone until in blossom, then mow and remove. Plough 6 or 8 inches deep and surface cultivate the remainder of the season.

3. The safest plan is generally a good summerfallow kept black all summer with a duckfoot cultivator, cutting off all leaves as soon as they appear and thereby starving out the roots.



CANADA THISTLE
[*Cnicus arvensis*]

4. Some have found it of advantage to give thorough spring cultivation until quite late in the spring, plough immediately, sow barley at about two bushels per acre and then plough deep immediately after harvesting the barley and give what surface cultivation may be possible during the remainder of the season.

5. Seeding down to grass is sometimes recommended. Brome grass will hold its own, and the grass will be cut before the thistles have time to mature.

6. Late fall ploughing, especially when done dry and deep, and the ploughing left rough to dry out over winter, will weaken the thistle roots and put them in good shape to attack during the following May with the duckfoot cultivator, which pulls the roots to the top when they dry out by the action of the sun and wind and die.

7. Probably a combination of some of these methods would be advisable, for instance, in very bad cases, suggestion No. 4 followed the next summer by No. 3. Fortunately as yet most cases are in the nature of patches of a few feet to a few yards in diameter. A very little work will in cases like these save many days labour a few years hence.

SOW CLEAN SEED

PERENNIAL SOW THISTLE—*Sonchus Arvensis*, L.

OTHER ENGLISH NAMES.—Field sow thistle, corn sow thistle, creeping sow thistle, milk thistle.

Introduced from Europe. A deep rooted perennial with large and vigorous running rootstocks. The young plant as it first appears, consists of a rosette of leaves lying close to the ground and when numerous completely covering the surface. These young plants have very short underground rootstocks and are comparatively easy to destroy, but as the plant grows readily in a great variety of soils, it soon becomes established, and sends up stems bearing leaves and flowers. The rootstocks grow long and send up numerous new shoots, one specimen examined last summer having 7 new shoots on 6 inches of root stock. Once the plant becomes established in this manner it is very difficult to eradicate.

The plant grows erect from 2 to 4 feet in height. The stem is smooth and hollow and the whole plant is filled with a bitter milky juice. Leaves are few on the stem but generally very abundant near the ground. In fact, one of the main characteristics of a patch of sow thistle is the great mass of leaves that cover the ground. The leaves are pointed, 4 to 8 inches long, and deeply cut, the divisions pointing backward. The base of the leaf clasps the stem. Plant slightly prickly all over, though a perfectly smooth variety is found occasionally. The flowers resemble the flowers of the common dandelion, being yellow and 1 to 1½ inches in diameter, 5 to 15 flowers on a single stem.

The seeds are dark reddish brown in colour, about one-eighth of an inch in diameter, and the surface is very deeply wrinkled with longitudinal ribs. Each seed bears at the top a tuft of white silky hair which when dry acts as a parachute and enables the seed to be carried long distances by the wind, more so than either dandelion or Canada thistle. The seeds of the sow thistle readily germinate in the fall. An average plant will produce between two to three thousand seeds.

This plant has been introduced into many sections of the province and strenuous steps should be taken to stamp it out. An ounce of prevention here is worth tons of cure. Anyone finding specimens of this plant, or plants that appear to be similar, is advised to send samples to Professor Willing, College of Agriculture, Saskatoon, or to the Weeds Commissioner, Department of Agriculture, Regina.

SUGGESTIONS FOR CONTROL.—As noted elsewhere the kind of treatment best adapted to a particular situation depends on the extent of area infested and kind and condition of the soil.

1. For small patches and wherever practical the best plan is to dig out the plants, roots and all or to cover with manure as in case of Canada thistle.

2. It is not advisable to let perennial sow thistle grow until it blossoms on the assumption that at that time the roots will contain less vitality. As a matter of fact it generally happens that the soil becomes so full of roots that it is more difficult to do anything with the patch. The general opinion at present is that the best way to deal with large areas is to start as early in the spring as possible and surface cultivate continually to



PERENNIAL SOW-THISTLE
[*Sonchus arvensis*]

prevent any leaf growth whatever, until the latter part of June, then plough 5 to 6 inches deep and keep black the remainder of the year by constant surface cultivation.

The following suggestions from the Ontario Weed Bulletin are worth a great deal:

1. Bear in mind that a few patches of perennial sow thistle if allowed to mature may seed down a whole farm.
2. Watch for the first few patches.
3. Sheep are fond of this weed and if turned on a field after harvest will prevent its seeding and by close cropping weaken the underground root-stocks.

SPRING AND FALL CULTIVATION.

The chief characteristic of annuals is the amount of seed they produce, and about the only way to destroy these seeds is to get them to germinate and then destroy the young plant. Seeds of some plants if given no opportunity to grow will remain in the soil 10 to 15 years without losing their vitality. As noted elsewhere, before seeds will grow they must have proper amounts of air and moisture and it was pointed out also that these proper conditions are obtained only by having the soil in good tilth.

In dealing with annuals and winter annuals the question of spring and fall cultivation is highly important. Many farmers today arrange to follow the binder with the disc harrow and find this a paying method. Moisture is then conserved during the fall while the stooks are on the ground, and besides it happens too often that the stooks are not removed before the ground is frozen and hence the advantage of following the binder with the disc.

At mention of work of this kind we too often quote the common excuse, "no time." We used the same excuse about pulling the first few mustard plants that appeared in our fields. Our present system of all wheat growing makes it difficult to do more than very ordinary cultivation, but when weeds get in we must find the time for the extra work, change our system or get out.

With reference to winter annuals it might be stated that they obtain their greatest foothold on account of the practice of stubbling in grain, hence late fall or early spring cultivation is essential to their eradication. The same is true of biennials.

Are weeds bad or is your system of farming at fault?

An unpardonable sin—to sow dirty seed on clean land.

Weeds are neither things of beauty nor joys for ever.

Even if you are a bit grouchy about farm work don't sow dirty seed on clean land.

WILD OATS—*Avena Fatua*, L.

Introduced from Europe. Annual, resembles the cultivated oat in general appearance only that it is slightly taller. The panicle is more branching and less coarse and the whole plant is generally covered with a white green bloom which enables one acquainted with the plant to distinguish it from a considerable distance.

The wild oat seed may be known by the two following characteristics: It has a horseshoe shaped scar at the base, sometimes called a sucker mouth, coltsfoot or spoon bill, and there are more or less stiff bristles surrounding the scar. While the oat is attached in the panicle there is present a stiff twisted awn, often bent at right angles, but this is generally broken off in threshing. Following are descriptions of various sorts of wild oats as given in Bulletin No. 2 of Manitoba Agricultural College, Winnipeg. (See cut on page 61.)

"1. Characteristic wild oat, very hairy with right angled awn and pronounced spoon bill.

"2. Only a few hairs at the lower end and more plump, but other characters the same.

"3. Less hairy towards the upper end.

"4. With scarcely any hairs on the main grain and none on the bosom oat.

"5. A similar bosom oat taken from a wild main oat with none of the characteristics of the wild variety.

"6. A brown hairless variety with pronounced spoon bill, but is not at all plump.

"7. A yellowish variety much like No. 6 except in colour.

"8. A white grain, no hairs but quite thin, the awn and bill being well marked.

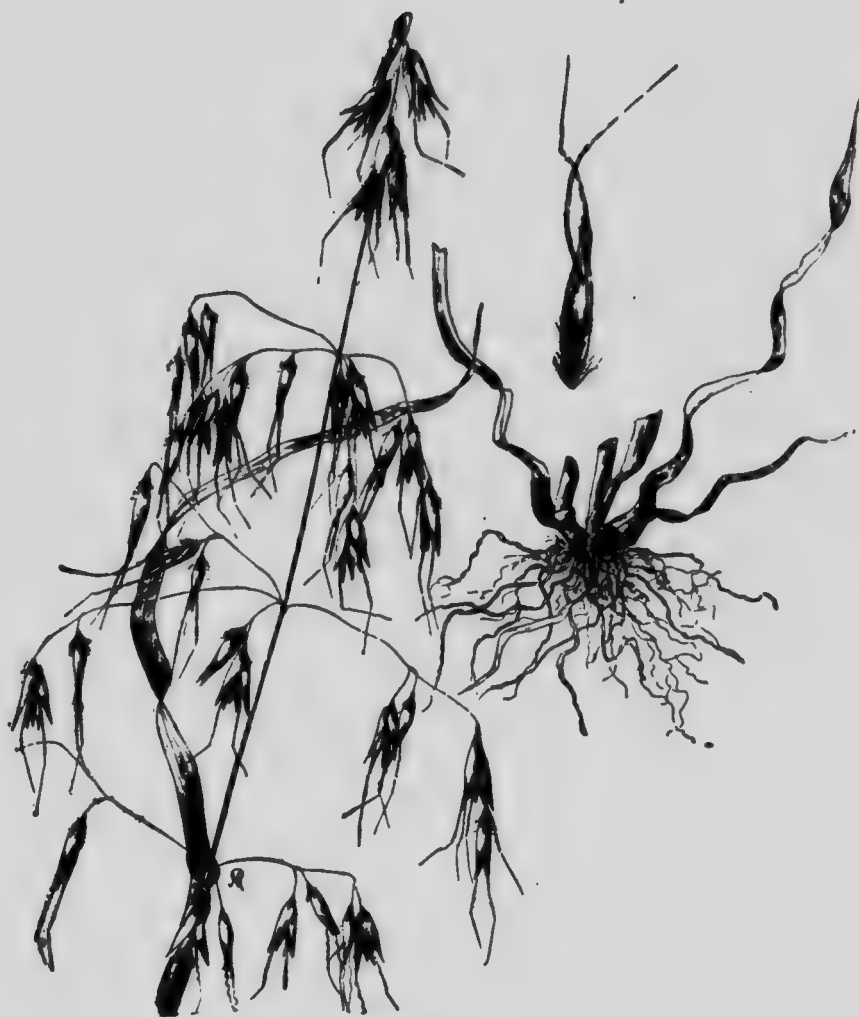
"9. A plump white grain, with no ordinary characteristics except the spoon bill.

"10. A larger and plumper white grain, very closely resembling abundance oats and presumably a false wild oat."

Wild oats are common all over the province, in fact it is very difficult to find seed oats free from the seed of this weed.

Wild oats will come through 3 to 5 inches of soil and will lie on the ground several years without losing their vitality.

SUGGESTIONS FOR CONTROL.—1. A good summerfallow properly done is a good plan, starting the previous fall by a very shallow ploughing in preference to discing which latter does not frequently cover sufficiently deep to secure a high germination the following spring. Very few of that year's oats will germinate that fall but by the fall ploughing the surface three inches of the soil is put into such a condition as to make possible the germination early in the spring of most of the oats in that portion of the soil. The first two weeks of spring is the ideal time for seed germination, and if no work is done in the fall, these two weeks of spring weather are generally lost. The field should be harrowed or disced every week or ten days until the middle or last of June when it should be well



Wild Oats.

ploughed. Each day's ploughing should be harrowed that day or better still at the same operation as ploughing. Give the field surface cultivation the remainder of the season.

But while good fallowing and the use of clean seed will keep down and control wild oats when the land is comparatively new and clean, it in itself will not control them sufficiently to escape serious loss of profits when the land becomes badly infested unless it is fenced and well stocked. Pasturing the summerfallow helps materially in securing better germination by the additional packing secured and the growth is subsequently eaten off by the animals. (Where stinkweed flourishes with the wild oats this method of pasturing is no good, as to control the young stinkweed requires too frequent tillage to allow any wild oat pasturage to accumulate and stock will not eat the stinkweed.) Seeding badly polluted fallow land the same year it is fallowed, at about the last week of August with 1 bushel of winter rye to the acre, will not only produce a profitable crop of grain the following year but will put such a crimp in the wild oats as to bring joy to the heart of the husbandman who has been afflicted with them. (Write Department of Agriculture, Regina, for Bulletin on Winter Rye.)

2. Trap crop. The sowing of oats or barley and cutting same for fodder is practised quite largely. By so doing the wild oats do not have time to mature before the crop is harvested.

3. Seeding down to grass, if left down about four or five years is quite effective.

4. Do not wait until the farm is overrun with wild oats before taking steps to bring them under control.

STINKWEED—*Thlaspi Arvense*, L.

OTHER ENGLISH NAMES.—French weed, pennycress, bastard cress, wild garlic.

Introduced from Europe. Annual and winter annual. Stem erect simple and branching two inches to two feet high, plant bright green and smooth. Leaves are numerous during the earlier part of the season, spear shaped and coarsely notched, clasping the stem with the arrow shaped base. The small cream white flowers are succeeded by very characteristic pods, about half an inch broad, quite flat, and all around each is a broad wing, notched at the top. As the pods ripen the green colour gives place to a characteristic greenish orange shade. Each pod will produce about 9 to 12 seeds and an average plant is capable of producing about 20,000 seeds. The seeds will under certain conditions retain their vitality 12 or 15 years. They germinate most readily through one inch of soil but will come through 3 or 4 inches. The plant has a peculiar odour and the name, stinkweed, is quite appropriate. The worst feature of the plant is its ability to withstand frost. A young plant about 4 or 5 inches high, when frost and snow comes will lie dormant and complete its growth when



Stinkweed.

spring opens up. These plants may have ripe seeds as early in the season as the middle of June. It will ripen seeds on plants 2 inches high. In other words it practically ripens seeds throughout the season. Its ability to produce such enormous amounts of seed is what makes it so troublesome.

SUGGESTIONS FOR CONTROL.—When the first few plants are noticed, care should be taken to pull and burn every plant that has developed seed and mark the spot for subsequent inspection. Although vigilance in pulling the first straggling French weed plants is well repaid as it postpones the evil day, still it generally turns out that when a farmer on our heavy clay soils once gets French weed, he has got it for keeps.

Early careful fallowing preceded by some form of fall tillage so as to encourage generous germination and a bountiful supply of stored moisture for the following crop, would seem to be the foundation stone upon which the successful control of stinkweed is laid. This practice supplemented by judicious harrowing of the crop the following spring just as young weeds are peeping up, will usually keep this persistent pest in fair control. Of course when soil becomes infested with stinkweed or most other weeds it becomes more necessary to perform each field operation, such as ploughing, harrowing, seeding, etc., with greater care, so that the best results from each operation may be secured, while the better crop thus obtained in some measure helps to repay the cost of the continual fight which it is necessary to put up. Seeding down is also another general purpose method of controlling most weeds including stinkweed.

WILD MUSTARD—*Brassica arvensis*, L.

OTHER ENGLISH NAMES.—Charlock, herrick, cadlock, fieldkale, Ontario mustard.

An annual introduced from Europe. Stems erect branching one to three feet high, rough with stiff hair, somewhat purple at the junction of the branches. The lower leaves are stalked and deeply indented or lobed with a large terminal lobe, upper leaves nearly stalkless. Flowers bright yellow about two-thirds of an inch across. Seed pod one to two inches long and slightly notched or constricted between the seeds, ending in a long two edged beak which contains one or two seeds and which usually breaks off as the pods reach maturity. Each pod contains 10 to 15 seeds and an average plant is capable of producing 15,000 seeds. The seeds, if given no opportunity to germinate, may, according to recent investigations by the Department of Agriculture, Ontario, remain in the soil 10 to 15 years without losing their vitality. Seeds will germinate best through $1\frac{1}{2}$ to 3 inches of soil, but not at all through 5 inches. The seed germinates at a low temperature, hence fall cultivation is very effective.

Closely allied to the wild mustard are the following species which require watching. The methods for controlling will apply to these as well as to the wild mustard.



Wild Mustard.

WILD RADISH—*Raphanus raphanestrum*.

Annual and winter annual, flower yellow slightly streaked with purple, pods are similar to those of the cultivated radish.

BIRD RAPE—*Brassica campestra*.

Annual, spreading very rapidly; only the root leaves are rough and hairy, remainder of the plant smooth.

BLACK MUSTARD—*Brassica negra*.

Annual, long spreading branches, square pods, only half an inch long, erect and closely pressed to the stem.

SUGGESTIONS FOR CONTROL.—All mustards and other similar bi-cotyledinous small seeded plants, respond to the same methods of control as suggested for stinkweed.

Mortgage companies are often characterised as heartless and unsympathetic, but they have nothing on wild mustard or wild oats.

HARE'S EAR MUSTARD—*Conringia Orientalis*, Andr.

OTHER ENGLISH NAMES.—Rabbit's ear, hare's ear cabbage, klinkweed.

Annual and strong winter annual. Introduced from Europe. Stem very leafy, erect with few branches. One and a half to two and a half feet high. Whole plant perfectly smooth and when young covered with a fine bloom like that found on cabbage leaves. Leaves fleshy, shape like a hare's or rabbit's ear, hence the name. Leaves clasp the stem by two rounded lobes. Flowers creamy white; pods four-sided 3 to 5 inches long, wiry. Seed about one-twelfth of an inch long, dark brown; somewhat the shape of a wheat kernel but on the corner of the lower end is a small projection which is quite characteristic. Average plant will produce about 1,500 seeds.

For controlling see under stinkweed.

Fenced farms	}	No weed problem
Clean seed		
Good cultivation		
Live stock		



Hare's Ear Mustard.

SOW CLEAN SEED

TUMBLING MUSTARD—*Sisymbrium altissimum*.

OTHER ENGLISH NAMES.—Fall sisymbrium, tumble mustard.

Annual, sometimes a winter annual as it is normally in Europe. The early stage is a rosette of thin, hairy, deeply toothed leaves flat on the ground, from which a branching stem grows to a height of two or three feet, bearing finely divided leaves which fall away when the plant ripens. The flowers are pale yellow and produce slender pods about three inches in length, each one containing about 120 seeds, and a single plant is capable of producing a million seeds. The seeds are very small and of a greenish yellow colour. When the plant is ripe it breaks off and is blown by the wind scattering its seeds far and wide.

SUGGESTIONS FOR CONTROL.—Another mustard, so, see stinkweed for control.

A tumbling mustard pulled in time saves 999,999.

Here today—Away tomorrow.



Tumbling Mustard.

SOW CLEAN SEED

BALL MUSTARD—*Neslia paniculata*.

OTHER ENGLISH NAMES.—Yellow weed, neslia.

An introduced plant, native of Europe. Annual and winter annual. A slender plant, two or three feet in height with narrow pointed leaves clasping the stem. The dark yellow flowers appear first in clusters at the ends of the branches, but as the stems lengthen the round shot-like pods are found scattered along them on thin stalks less than an inch in length. The wrinkled pod, which does not split open when ripe, contains one small yellow seed.

SUGGESTIONS FOR CONTROL.—Same as outlined under stinkweed and other mustards.



Ball Mustard.

FALSE FLAX—*Camelina Sativa*, Crantz.

Very often wrongly called ball mustard. It may be well to mention here that the ball of ball mustard is the seed itself, but the ball of the false flax contains 10 to 12 seeds. Introduced from Europe, annual and winter annual, one and a half to two and a half feet high. Erect and branched above, the lower leaves are long and have a stem, but the upper ones apparently clasp the stem with arrow shaped bases. Flowers cream colour; pods pear shaped; seeds yellow, resembling very much a miniature wheat kernel, generally about ten or a dozen seeds in a pod.

Another variety, flat seeded false flax, has a seed much the size and shape of a very large pin head, rather flat and round. The plant is similar to the common false flax, except that the pods are larger and nearly flat on top. This is a very bad weed and common in flax seed.

SUGGESTIONS FOR CONTROL.—1. Watch for the first few plants that appear in the field and hand pull. This is the best plan to follow to keep the field clean. If clean seed is sown it will not require much time to pull all the weeds of this nature that get into the field from other sources.

2. Being a winter annual, plants that start in the fall will complete their growth in the spring. Hence the too common practice of stubbling in grain permits the rapid spread of these plants. Cultivation in the fall or early spring will destroy these young plants and also induce the germination of the seeds.

3. In very bad cases the best plan is to give a good summerfallow.

4. Seeding down, if left in grass three or four years is very effective.

HAND PULLING.

It should be kept in mind that the first part of the weed seed to ripen is the little germ of embryo, and when pulling or cutting weeds upon which the seed pods have formed, care should be taken to have the plants destroyed, because many of the seeds may be ripe enough to grow or may be able to obtain from the green plant sufficient nourishment to permit them to ripen. A commendable method followed by many careful farmers when hand pulling weeds is to carry a grain sack in which to put the weeds as they are pulled. They can afterwards be mixed with straw and burnt.



False Flax.

RUSSIAN THISTLE—*Salsola kali*, v. *tragus*, Moq.

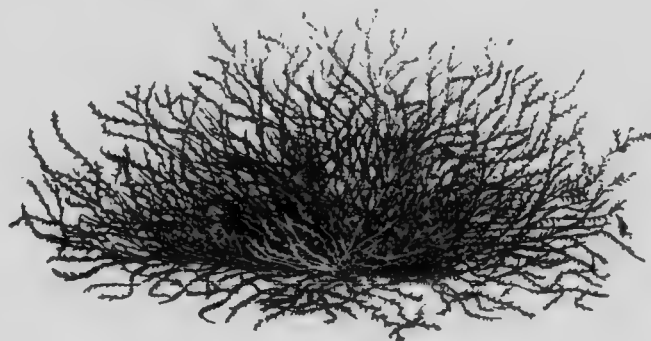
OTHER ENGLISH NAMES.—Russian tumbleweed, Russian cactus.

Introduced from Europe. Annual. The young plant is very much like a pine seedling, but as it becomes older it develops into a low branching bushy plant with a very small tap root. Before the flowers appear it is of a very dark green colour and the branches are striped with red. The leaves are needle shaped and about 2 inches long. When the flowers are gone and it begins to ripen the little bracket which incloses the seed becomes very spiny and the whole plant turns colour, the green changes sometimes to a reddish hue and on into a gray or straw colour. When it ripens the roots seem to decay, so that the wind easily breaks the plants away and it rolls over the prairie scattering seeds for miles. A good healthy Russian thistle is capable of producing about 50,000 seeds, and if these were shelled out in the first ten miles the weed travelled it would mean practically a seed to every foot. The seed are often found in alfalfa seed, and anyone purchasing clover seed should carefully examine it first or send it in for analysis. Too much precaution cannot be taken.

SUGGESTIONS FOR CONTROL.—1. In our prairie sections some think that little can be done until each farmer has his farm fenced. But this is not the case, nor is fencing a cure any more than it is for tumbling mustard as in either case the travelling weeds will pile up and jump over any ordinary fence. The thistle is easily killed when just coming through the ground, therefore, when the grain crop is badly infested harrowing of the crop is advisable.

2. One of the characteristics of the plant is its ability to withstand drouth, and when in wheat fields where it has apparently become crowded out, a close examination will show that it has just stopped growing. It will remain in that state until the crop is harvested when it takes new life and branches out. Before frost comes it will grow to a bushy plant sometimes two feet in diameter and with the first heavy wind goes tumbling across the fields. This is one of its worst features. Probably the best course to take is either to follow the binder with the disc harrow or to stack the grain or thresh early and plough shallow.

A little of Russian thistle goes a long way.



Russian Thistle.



Russian Thistle,

PURPLE COCKLE—*Lychnis githago*.

This is an upright growing annual of European origin with long narrow opposite leaves covered with fine silky hairs. Its flowers are purplish and about one inch in diameter. The seeds are blackish in colour, of a rounded triangular shape. They have a rough surface and are of a poisonous nature. To control see stinkweed or other mustards.

COW COCKLE—*Saponaria vaccaria*.

OTHER ENGLISH NAMES.—Cowherb, China cockle.



A smooth annual growing about two feet high with pointed opposite clasping leaves which are smooth and gray like those of cabbage. Its flowers are pink and about half an inch in diameter giving place to seed pods within a five angled calyx. The seeds are globular with a slightly granulated surface black in colour. It ripens about the same time as wheat. It is very abundant in many portions of the province, but originally came from Europe. Being very conspicuous when in bloom, hand picking may readily be practised when not too abundant.

SUGGESTIONS FOR CONTROL.—See stinkweed.

SUMMERFALLOWING.

The bare summerfallow is considered quite essential by the most successful grain growers in Saskatchewan. Its purposes are many, the most important being the storing of moisture from one year to the next for the production of a full crop in a season when the rainfall might be insufficient. Another reason is that it is very necessary as a means of destroying weeds. Again, the continual ploughing under of stubble sometimes fills the soil too full of useless matter unless this is given a chance to decay by an occasional good summerfallow. A summerfallow to be effective must be done right. The best method is as follows:

Start the previous fall by giving the field a stroke with the disc harrow or much better a shallow ploughing although frequently time does not permit of this. This is the most important part of the whole work, not so much because there will be many seeds germinated in the fall, but because it makes proper conditions for germination of seed in the early spring and also prevents loss of moisture during April and May while the spring work is being done. In the ordinary plan of farm work it is seldom found possible to disc the summerfallow early in the spring, and this is one reason for advocating its being done in the fall. *A fact of great importance but recognised by few is that the early spring is about the only time of the year when it is possible to get the seeds in the surface two inches of the soil to germinate.*

If weeds are very bad it is advisable to disc again the first of June thereby killing a crop of weeds and preparing the soil for a second crop before ploughing during the latter part of June. It has been found that the best results are generally obtained by ploughing 5 to 8 inches deep about the first to the last of June and then giving the land constant surface cultivation during the remainder of the season.

The following report of Mr. Angus MacKay, formerly superintendent of the Experimental Farm, Indian Head, is as valuable now as when it was written in 1901:

"As has been pointed out in my previous report early and thorough work on the fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

"First Method.—Ploughed deep (6 to 8 inches) before the last of June, surface cultivated during the growing season and just before or immediately after harvest ploughed 5 or 6 inches deep.

"Results.—Too much late growth if season was at all wet, grain late in ripening.

"Second method.—Ploughed shallow (3 inches deep) before the last of June, surface cultivated during the growing season and ploughed shallow (3 to 4 inches deep) in the autumn.

"Result.—Poor crop in a dry year, medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

"Third Method.—Ploughed shallow (3 inches) before the last of June, surface cultivated during the growing season and ploughed deep (7 or 8 inches) in the autumn.

"Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

"Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June. Surface cultivated during the growing season.

"Results.—Sufficient moisture conserved for a dry year and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods are followed. For the past fourteen years the best, safest and clearest grain has been grown on fallow worked by this method and the method is therefore recommended.

"Fallows that have been ploughed for the first time after the first of July, and especially after the 15th, have never given good results, and the plan too frequently followed of waiting until the weeds are grown and often ripe and ploughed under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

"In the first place after rains are over in June or early in July, as they usually are, so amount of work, whether deep or shallow ploughing, or surface cultivation can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

"Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousandfold to the myriads already in the soil and does not materially enrich the land."

It may be well to point out that the harrow is most effective when used immediately after or at the time of ploughing the summerfallow as the soil is then most easily worked down, thus helping to retain the moisture and also leaving the land in better condition for effective weed destruction by subsequent harrowing. Some persons in carrying out this idea before leaving the field at night harrow what they have ploughed during the day, others attach a section of the harrow behind the plough and thus lose no time. We cannot always do the things the way we know they should be done, for "a man can but do his best," but the most unforgivable thing in the world is to find that a man has *not done his best*.

HARROWING CROPS.

This practice is finding favour with an increasing number of farmers and some great claims are being made as to its value as a means of killing weeds, and conserving moisture and thereby increasing the acre yield. It is well to point out however that the work must be done judiciously, as there are conditions under which more harm than good will result. If the soil is loose and open the harrow will work to too great a depth and destroy a large portion of grain. The proper conditions are those such as will be found on a summerfallow that has been well worked the previous season and is very compact finely grained, free from clods, lumps of earth, rubbish sod, etc. Since the object of harrowing is to kill weeds and form a mulch to conserve moisture, the work should be done at such times as will most nearly accomplish the results desired. It is safer to harrow wheat when it is just coming through the soil and any time again after it is 4

inches high and until it is 7 or 8 inches. Weeds are more easily destroyed when the first leaves are just coming through the ground. After a rain storm a crust will often form on the surface of the soil. This should be broken up with a harrow, otherwise its presence greatly facilitates the evaporation of water from the soil.

The following experiment will clearly demonstrate the truth of the above. Thoroughly moisten a couple of feet of ground, give one foot of this surface cultivation with a hoe and leave the other untouched. In a week or so examine the soil 5 to 10 inches below the surface of both and note the greater amount of moisture under the cultivated surface. Experiments of this nature will demonstrate many truths of good farming. Study the fields. It will soon be evident to you when to harrow and when not. Do not try a large acreage the first year. Try 5 or 10 acres and watch results. Harrowing will usually cause the crop to be a little later than it otherwise would, so, if you intend to harrow your growing crop sow from one gallon to one peck more seed per acre.

CHANGING SEED.

One of the common characteristics of man is his inability to realise that there may be anything wrong with him or his method of farming. This characteristic used to find expression in the practice of changing seed, a practice that had no advantage and the chief feature of which was to bring to the farm new varieties of noxious weeds. Fortunately this practice is not very common at present. Many inquiries are received by the department as to the varieties of grain. A man should stay by the standard varieties until the new varieties have been proven out by experimental farms. Reports of the farms may be had at any time by writing to Ottawa or to the local stations, and these indicate which varieties are most suitable for the west. Make sure that the method of farming is not responsible for low yields before trying new varieties. Get in touch with the Canadian Seed Growers' Association, Ottawa.

SOW CLEAN SEED

GREAT RAGWEED—*Ambrosia trifida*.

OTHER ENGLISH NAMES.—Crownweed, kingweed, crowfoot.

A native found mostly on heavy clay land. Its seeds being difficult to remove, are very objectionable in wheat.

Annual. A rough coarse upright weed with large opposite leaves, most of which are three lobed. The flowers are of two kinds, the sterile, borne on tapering spikes about four inches in length, being green above and dull yellow beneath. The seed-bearing flowers grow close to the stem in clusters at the bases of the spikes and leaf stalks. The seed is about the size of a grain of wheat, but tapering at one end and having hornlike projections just above the middle which suggest the name "crownweed."

SUGGESTIONS FOR CONTROL.—Hand pull. Spring and fall cultivation. Sow crop to be cut for green feed. Seeding down. Summerfallow.

"Breathes there a man with soul so dead
Who never to himself has said
This is my own, my native land?"

Yes! and you will find him on a weedy farm that shows evidence of carelessness and shiftlessness.



Great Ragweed.

SOW CLEAN SEED

BLUE BURR—*Echinos permum* Lapulla.

OTHER ENGLISH NAMES.—Stickweed, beggar's lice.

An introduction from Europe by way of Eastern Canada. Especially noticeable on roadsides and in waste places, but also abundant in crops sown on stubble.

Annual and biennial. A grayish green weed seldom growing over two feet in height. Its leaves are narrow and hairy and it has small blue flowers like those of the forget-me-not. The seed has a double row of barbed prickles around its triangular covering, which is about one-twelfth of an inch in length and adheres readily to the clothing or to the coats of animals. Plants have a heavy disagreeable odour very perceptible when a number of them are growing together. Seeds are often found as an impurity in grass seed.

SUGGESTIONS FOR CONTROL.—Hand pull. Cultivate in fall and spring. Summerfallow carefully. Watch the roads and firebreaks. Seeding down is effective. It is one of the few weeds that sheep will not eat. Spring cultivation followed by oats to be cut for feed is effective.



Blue Burr.

SOW CLEAN SEED

NIGHT FLOWERING CATCHFLY.

OTHER ENGLISH NAMES.—*Silene nocteflora*, sticky cockle.

Introduced from Europe. Annual, winter annual. Erect, one to three feet high, somewhat branching, whole plant covered with soft glandular hairs. Lower leaves ovate, narrowed at the base, stem leaves lance shaped, flowers few, about one inch across, pinkish inside, yellowish white outside, opening at night. Only recently introduced into the west, it is a heavy seeder and gives trouble in clover fields. *It is a common impurity in clover and grass seed, especially in the seed of alsike clover.*

SUGGESTIONS FOR CONTROL.—Spring and fall cultivation, or in bad cases, summerfallow.



Night Flowering Catchfly.

SOW CLEAN SEED

TANSY MUSTARD—*Sisymbrium incisum*.

OTHER ENGLISH NAMES.—*Sisymbrium incisum*, variety *flipes* is known as green tansy mustard. *Sisymbrium incisum*, variety *Hartwegianum*, is gray tansy mustard.

Both are natives and only give trouble in a crop when it has been sown on stubble or when a summerfallow has been neglected during the latter part of the season.

Biennial. A rosette of leaves being the first year's growth. Slender plants growing to a height of 2 or 4 feet, with finely divided leaves, bright green in one form and gray green in the other; the latter is the coarser and ranker growing plant. They produce a great number of small yellow flowers, the fruit being a narrow pod, less than three-quarters of an inch in length. The minute seeds are longer than their breadth and brownish red in colour.

SUGGESTIONS FOR CONTROL.—If only a few plants hand pull. Spring and fall cultivation. In bad cases give a summerfallow. Seeding to grass may be advisable.

If you are too busy this summer to pull those weeds, don't count on having time next summer, because you won't.



Tansy Mustard.

SOW CLEAN SEED

WORMSEED MUSTARD—*Erysium Cherianthoides*.

OTHER ENGLISH NAMES.—Treacle mustard.

A native which responds quickly to cultivation, making a rank growth on stubble or about edges of fields. The seeds have a very pungent and acrid flavour objectionable to stock.

Annual, winter annual or biennial. Slender and inconspicuous in the wild state, but growing a stout stem three feet or more in height in the grain crops. The leaves are lance shaped and several inches in length. The flowers are small and yellow. The pods are slender, about one inch long and growing at an angle, with their small stalks parallel with the stem or branch to which they are attached. Seeds are very small and brownish yellow colour.

SUGGESTIONS FOR CONTROL.—

1. Hand pull if possible and practicable.
2. Fall and spring cultivation.
3. In very bad cases, summerfallow.
4. Seeding down will be very effective.
5. Spring cultivate and sow oats late for green feed.



Wormseed Mustard.

SOW CLEAN SEED

SHEPHERD'S PURSE—*Capsella bursa-pastoris*.

Introduced in garden seeds from Europe by way of Ontario, where it is well known as a garden weed. In the prairie provinces it has proved itself capable of doing serious damage not only to gardens but to wheat fields. Inspectors report it as being in certain localities more injurious to crops than stinkweed. It is abundant on the roadways in some of the older settlements.

It is an annual and winter annual, ripening seeds throughout the season. The plant consists of a tuft of toothed or deeply notched leaves at the ground, from which a more or less branching stem arises, bearing clusters of small white flowers which produce flat triangular pods containing a score or so of very small reddish yellow seeds. These seeds may be buried deeply but will grow after many years when brought near to the surface again.

SUGGESTIONS FOR CONTROL.—Shallow cultivation in fall and spring, summerfallow, seeding down.

Things that you find out for yourself are ten times as valuable to you as those which are told you.



Shepherd's Purse.

SOW CLEAN SEED

DARNEL—*Lolium temulentum*.

Darnel has not yet been noticed in the province. It stands in the same class as wild oats and chess in the matter of difficulty in distinguishing the plant from that of the wheat or oats. It grows at about the same height as these grains.

It may be recognised as soon as it heads out from the appearance of the head which resembles that of the couch-grass, but differs in having the edge of each little spikelet facing the stem instead of being broadside as in couch-grass.

Darnel is an annual, spreading by seed only. It appears to be able to grow under most adverse conditions, and for this reason it bids fair to become a most troublesome weed if it is not kept in check. The seed of this plant resembles a small kernel of barley, and is very apt to be overlooked.

SUGGESTIONS FOR CONTROL.—It is much lighter than wheat and may readily be blown out of this grain with the fanning mill or floated off when the wheat is being treated for smut.

A regular rotation which includes two or three years of grass, will greatly reduce this weed. Surface cultivation after harvest is also of great assistance, as it covers the seed and hastens the germination in the spring, thus giving an opportunity to destroy the young plants before the grain is sown.

Be sure your methods of farming are right then "go to it."

"Treat your weeds as you would have your neighbour treat his only do yours first."



Darnel.

SOW CLEAN SEED

SWEET GRASS—*Hydrochloa borealis*. R. & S.

A native sweet scented perennial grass which is found in low parts of the prairie. It has a spreading head, golden brown in colour and ripens seeds early in June. Its root stocks penetrate much deeper than those of the couch-grass and are especially difficult to eradicate from cultivated fields during wet seasons. In Alberta and Saskatchewan the method that has given most satisfaction has been deep, clean ploughing, just, before the seeds ripen followed by heavy seeding to barley or rye. After the crop has been removed and as late as frost will allow, the land should be again ploughed. At the Indian Head Experimental Farm, Mr. MacKay preferred the following method. He says, "We find that to plough early or when in flower only helps this weed. I would advise ploughing deeply in the latter part of July or in the beginning of August, then harrow well and repeat in September and October. With us when ploughed early, every root in the ground grows, while if ploughed after wet weather, when the growing season is over, it is easily killed."



Sweet Grass.

WATER HEMLOCK—*Cicuta Occidentalis*.

OTHER ENGLISH NAMES.—*Cicuta* or poison parsnip.

This is a plant which in Europe and various parts of America is known to be harmful. Although several species occur in different localities the poisonous properties seem to be much the same. It is parsniplike in appearance, but the flowers are white, and it is found growing in low, damp places or on banks of creeks or lakes being much more abundant after a series of wet seasons. It may be distinguished by the cluster of fleshy roots, which have a sweet aromatic odour. These roots are the most poisonous parts of the plant, containing as they do a volatile oil, which is especially powerful after the stalks have died away in the fall and until new plants have grown in the spring. It would not, however, be safe to say that the stems, leaves and seeds are not poisonous, as it would seem that a number of horses were affected by cropping portions of *cicuta* growing in a pasture near Regina in the latter part of August. The symptoms in this case were: Diarrhoea with weakness, temperature about 103 degrees. Two showed partial paralysis with slight muscular spasms. The heart action was irregular and of tumultuous nature. All recovered. In this case the animals must have had a very small quantity of the poison, which is so strong that a piece of the root, the size of a marble may prove fatal to man. The symptoms of *cicuta* poisoning of sheep as observed in Montana were, an attempt to run in any direction, cerebral frenzy, accompanied by involuntary muscular movements, which suggest colic; the respiration was laboured and irregular, the pulse wiry and intermittent. In some cases of cattle being poisoned they died within fifteen minutes of the first signs. Sheep have died suddenly in various parts of the Maple Creek district. In every case where deaths have been frequent, *cicuta* was found to be growing near where the sheep had been watered. Permanganate of potash should be promptly administered and morphine may be given hypodermically as follows: for sheep, 1½ grains; for cattle and horses, 3 to 10 grains. If drugs are not handy, try melted lard.

IMPORTANT.

When you find a plant you are not acquainted with send it to the Weeds Commissioner, Department of Agriculture, Regina, or to Prof. T. N. Willing, College of Agriculture, Saskatoon. Send pieces of the root, stem, leaves and flower. It will be worth a thousand dollars to you to know the first plant of sow thistle that takes root on your farm. As to your seed grain do not fail to test for germination as outlined in this bulletin. If you are not acquainted with the seeds of the noxious weeds, send a sample in for examination, this is especially important when buying grass seeds, clover seed or alfalfa. It will pay you to send \$1 to the Superintendent of Stationery, Ottawa, for a copy of "Farm Weeds," a book bound in cloth and containing coloured pictures of 70 of the common weeds, enlarged pictures in natural colour of all the common weed seeds, as well as detailed information about these weeds.



Water Hemlock.

WHITE STEMMED EVENING PRIMROSE—*Anogra pallida*, v.
leptophylla.



A native perennial, growing on sandy soil and proving somewhat persistent owing to its deep running rootstocks. Its stem and branches are smooth and white and sometimes have shreddy bark. The leaves are from 1 to 4 inches long, very narrow and wavy. The flowers are from 1 to 1½ inches broad and waxy white or pink in colour.

Plough deep and cultivate as recommended for *Canada Thistle*.

POVERTY WEED—*Iva axillaris*. Pursh.

A perennial native plant less than a foot in height but having tough spreading underground stems. Its flowers are small and not conspicuous, hanging short stalked in axils of the upper leaves. Leaves are rough, narrow and about an inch in length. This weed has been found very difficult to eradicate and needs well directed persistent efforts with sharp implements. In cultivated land it is first noticed around the edges of dry sloughs or low fences, but soon spreads to the adjoining cultivated upland. Poverty weed thrives immensely under the system of stubble farming preceded by a summer-fallow ploughed shallow and only once.

How to eradicate this persistent pest is yet largely a matter of theory, but as it is a perennial and has a long and tough underground rootstock deep ploughing is recommended late in the fall when the land is dry. Follow this up the next spring with the necessary top tillage, preferably with a duck foot cultivator to pull the roots up on top to wilt and die. Then plough deeply again after the rainy growing season is over or just before harvest. Additional similar top tillage from that till winter will so kill or weaken the plants that the following year's crop will usually choke out the remaining plants. Where poverty weed is bad in no case should a stubble crop be sown. It is thought that when a fallow is handled as above set forth and then sowed about the twenty-fifth of August to winter rye, the vigorous early growing rye, in the following spring, will beat out the poverty weed from the start. Seeding down to brome or rye grass also seems to crowd out this weed, which never seems to show up much even in the virgin prairie.

**COUCH-GRASS—*Agropyrum repens*. L.**

A slender perennial grass with tough creeping rootstocks which spread through the soil for a depth of three or four inches. It is sometimes called twitch grass, quack grass or scutch grass in its young stage, but after it has headed out it may be recognised by its peculiar spike or head in which the small spikelets will be found with their flat side facing the stem. The leaves are dark green, rather distinctly veined and slightly hairy below.

Once this weed is established, it is easily known by the large matted beds which it forms, and in which nothing else

is able to grow. The long branching, jointed rootstocks send up a new plant from each joint, which helps the plant to spread rapidly.

SUGGESTIONS FOR CONTROL.—Some recommend ploughing during the first week in June, sowing at once with barley and ploughing again after the barley is harvested. But in Saskatchewan our season is usually too short and too dry to grow much of a crop of barley under such methods of tillage and with such a keen competitor as quack.

A better method is to fall plough late and just deep enough to get below the root system (say 4 inches) and the dryer the condition the land is in the better. Do not harrow but leave the ploughing to go into winter in that open condition. Spring will then find the quack plants still alive but weakened. May is usually a dry month during which this quack land should be just sufficiently disced and harrowed to permit the duck foot cultivator (with narrow feet) to work on it at frequent intervals (say once a week) shaking the sods and roots about until they are dried out by the sun and wind so that the roots will be finally killed. Do not plough deeply a second time till all or practically all the plants are dead as deep ploughing at any time merely transplants and places beyond the reach of the ordinary harrow or cultivator any shallow growing plant with creeping roots. Avoid putting a crop on stubble when quack grass is established and this applies to all perennial plants with creeping roots such as Canada thistle, sow thistle, poverty weed, native or eastern quack and brome grass.

STEMLESS LOCO WEED—*Oxitropis Lamberti*. Pursh.



Loco Weed. This is a term applied to several species of the pea family which have been suspected of causing serious trouble in the flocks and herds of the Western States and of Alberta. The eating of the loco seems to be an acquired habit which has recently been observed to some extent on the other side of the line in ranching districts and a good many affected horses have been brought over for sale. Two species, *Oxitropis Lamberti* and *O. splendens*, are abundant from Manitoba to the Rockies. The flowers of the former are mostly pale yellow; those of the latter are purple, and this plant has a much more silvery appearance than *Lamberti*. The United States Government has fully investigated the subject of loco poisoning and the results have been published in Bulletin 112 of the Bureau of Animal Industry which can be had upon application to Department of Agriculture, Washington, D.C. The symptoms are drooping head, rough coat and irregularities in gait and action, such as may be produced in man by alcohol. Sight is frequently affected to a greater or lesser extent, and so also is hearing. In chronic cases of the loco

habit in sheep the animal becomes emaciated and crazy, perhaps sheds all or part of the wool and becomes unable to care for itself and may lose sight of the land. Fits of trembling are of frequent occurrence until death from exhaustion and inadequate nutrition is the result.

BLUE LETTUCE—*Lactuca pulchella*.

This is a native perennial plant with spreading rootstocks. It grows from two to three feet high, with smooth, deeply toothed leaves, from which a milky juice exudes when broken. Its flowers are light blue and about three-quarters of an inch broad. Should be treated as recommended for Canada Thistle.



SMALL WALLFLOWER—*Erysimum parviflorum*.

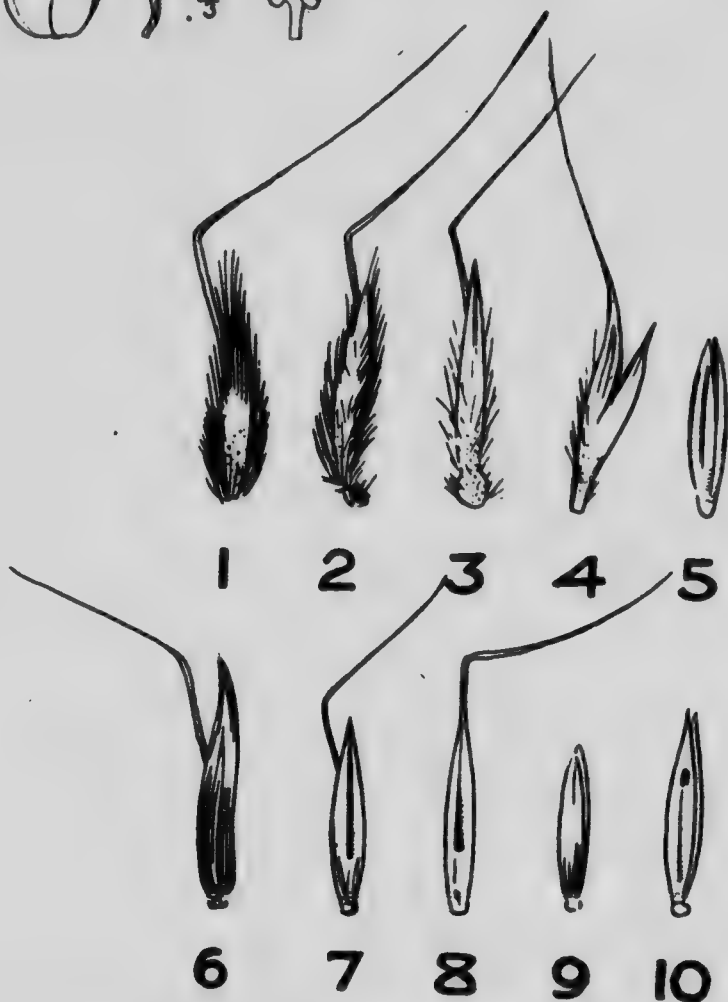


A native biennial of the mustard family which sometimes appears ahead of the grain in crop sown on stubble or a carelessly worked summerfallow. Its flowers are yellow and about a quarter of an inch across. The slender seed pods are about two inches in length, containing small irregularly-shaped brownish seeds. The whole plant is of a sage green colour. This plant is often mistaken for wormseed mustard. There is somewhat of a resemblance, but the plant is coarser throughout, flowers larger and pods at a different angle, more rigid.

SUGGESTIONS FOR CONTROL.—
Cultivate fall and spring.

SPEARLEAF GOOSEFOOT—*Monolepis Chenopodioides*. Mop.

A low spreading native annual, dark green in colour, with inconspicuous flowers. The leaves somewhat resemble in shape those of lamb's quarters, or of sheep sorrel. It makes an early growth and in this way smother the young wheat or oats. Many bare spots in crop have been caused by this weed, which is not hard to kill by the ordinary methods adopted for annual weeds. The use of the drag harrow is effective



Seeds of Wild Oats. (See page 16.)

TESTING SEEDS FOR GERMINATION.

No grain should be sown without first being tested for germination. Anyone can make the test in the home and secure just as accurate results if the simple instructions are followed as can be obtained in the best of seed testing laboratories. Many farmers who failed to test their grain last spring would have saved many hundreds of dollars as well as a great deal of time and labour had they conducted this little experiment. The following was reported to the department last summer: A man sowed a field of wheat early in the year and because it had been very badly frosted and weathered only a very few grains sprouted, so he sowed it again about the first of June with oats. He had not tested the wheat. Had he tested the oats he would have found that they too had no germinating power left and he probably would have remembered that they were frozen the previous fall. Finally in desperation he sowed the field to frozen flax seed. One must refrain from making comments on such proceedings, but had he taken the trouble to test his grain he would have been just as wise in the fall and much less sad.

All that is needed to conduct a test is a little common sense together with two pieces of flannel a couple feet long and about 8 inches wide, a pie plate 8 inches in diameter and a common saucer about 6 inches in diameter. Place the saucer upside down in the bottom of the plate, pour water into the plate until the saucer is one third covered, and throughout the test add water occasionally to keep to this level. Next fold one piece of flannel so that it will nicely cover the saucer and so that the edges of the fold lie into the water around the saucer. On the cloth where it comes over the saucer spread the grain to be tested. In grain testing one of the important things is to keep the grain moist all the time but not covered with water. The edges of the cloth upon which the grain rests being in water, the sample will be constantly kept moist. Over the grain place the other piece of flannel loosely folded. This will aid in maintaining evenness of temperature and prevent the upper surfaces of the kernels becoming dry. Now set the dish with the grain in some place in the room where the temperature will be most nearly uniform. In selecting the sample for testing count 100 grains. Do not pick out all the big kernels but take them as they come, thereby getting a test of the sample as it will be sown. In a high class sample of wheat 85% of the grain should produce vigorous sprouts in two or three days and 90% should germinate inside of 5 days. If 90% germinate inside of 8 days and 75% are strong sprouts, it may be considered fairly good, but if less than 75% germinate inside of 10 days, it is poor and means that much heavier seeding must be done in the spring. It will be advisable to purchase new seed if you can and get it as clean of weed seeds as is your own. Oats require about one-fifth more time than does wheat. Flax requires nearly the same as wheat. Oats germinate better in March than they do in November. Flax, as a rule, germinates better in the soil than in the testing apparatus. Every man should test his grain. It is in order to add here that if you are not acquainted with the seeds of the noxious weeds be sure to send a sample of your grain to the Weeds Commissioner, Regina, or to Professor Willing, College of Agriculture, Saskatoon, where it will be examined, and returns mailed to you forthwith.

SEEDING DOWN.

This is a practice that many farmers have found of great value in bringing weeds under control. Its chief value is as a means of holding weeds in check on a portion of the farm and thereby enabling the owner to devote a larger share of his time to other parts of his farm. In some instances wild oats and perhaps a few other weeds might be eradicated by this plan, the principle being that the grass can be cut for hay before any of the weeds have ripened. Some have found that brome grass will hold its own against Canada thistle and even against sow thistle. In some cases wild oats may be eradicated by leaving the land to grass for several years. Professor Bracken, of the College of Agriculture, Saskatoon, gives the approximate rates per acre for seeding as follows:

"For heavy and low lying land in the south-west: Brome grass No. 8, red top 8 lbs., white clover $\frac{1}{2}$ lb., alsike $\frac{1}{2}$ lb.

"For light uplands in the south-west: Brome grass or Kentucky blue 8 lbs., western rye 8 lbs., white clover $\frac{1}{2}$ lb., alfalfa, $\frac{1}{2}$ lb.

"For heavy and low lying land in the north-east: Western rye 8 lbs., red top 6 lbs., white clover $\frac{1}{2}$ lb., alsike $\frac{1}{2}$ lb., timothy 4 lbs.

"For light uplands in the north-east: Western rye, 8 lbs., Kentucky blue 8 lbs., white clover $\frac{1}{2}$ lb., alfalfa $\frac{1}{2}$ lb.

"These two divisions of the province are, of course, quite arbitrary. We shall no doubt find that different mixtures will give better results in some of these areas, but at present, our knowledge is insufficient to warrant us in suggesting different mixtures for various localities.

"A great deal of comment has been common lately as to the difficulty of eradicating brome grass. The trouble seems to be that few have known how best to go about it. It is a particular farm crop and requires particular treatment; the eradication of brome grass is mostly a matter of knowing how."

BROME GRASS.

Brome is often compared to quack because of the alleged difficulty of getting rid of it. But brome is easy to eradicate compared with quack and succumbs readily to the same treatment as set forth on page 51.

There is no use in endeavouring to kill this class of plants in wet weather or ploughing them deeply with the idea of getting them out of one's sight as such treatment only makes them grow all the better.

SOW CLEAN SEED

GERMINATION OF SEEDS.

To see some of the methods of farming we practise in the West one would think that all it was necessary to do to get seeds to grow was just to scatter them out on the ground. In fact, when the practices are studied it is quite easily understood how some of us find it impossible to control weeds. Following is a short paragraph on the depth of soil, through which weed seeds will germinate, taken from the North Dakota Agricultural College Bulletin No. 62. It will be noticed that the smaller the seed the nearer the surface it must be to germinate, the larger the seed, the deeper it may be placed without hindering its power of germination.

"The seeds used were fresh from the field and were found to be viable at the time of planting. An abundance of seed was planted in each area so that it occasioned no difficulty for us to find large numbers for germination tests whenever wanted.

"1. Small weed seeds the size of naked timothy seed will not come up ordinarily through two inches of soil. Such seeds include shepherd's purse, tumbling mustard and pepper grass.

"2. French weed (pennycress) comes up abundantly through one inch of soil, unwillingly through two inches of soil and not at all through three inches of soil.

"3. Green foxtail, also yellow foxtail and pigeon grass germinate about May first and do not germinate in the fall from seed gathered the same season.

"4. Wild mustard comes up most abundantly through one inch of soil, very abundantly through two inches of soil, and not at all through five inches.

"5. Wild mustard and French weed seed will not be preserved in the soil for a period of years unless deeper than three inches.

"6. King-head (great ragweed) grows better when planted two and three inches deep than one inch, and it will come through five inches of soil.

"7. King-head grows more abundantly the second than the first year after planting.

"8. Wild buckwheat comes up readily through one, two and three inches of soil.

"9. Wild oats will come through five inches of soil.

"10. Wild buckwheat was entirely dead when buried twenty months.

"11. Wild oats was practically dead when buried twenty months and entirely dead when buried fifty-six months.

"12. Shepherd's purse, green foxtail and king-head were practically dead when buried fifty-six months.

"13. Wild mustard and French weed had good germination after being buried fifty months.

"14. The deeper buried seeds are best preserved. This holds true up to the depth of ten inches.

"These statements, I think, will hold true for the heavier lands of the Red River Valley and essentially true for other ordinary soils. It is possible that some variations from these results might readily occur, especially on lighter, more sandy, droughty soils."

A few illustrations of the lessons to be drawn from the above will indicate a little of the value of these results. Note that stinkweed did not come at all through 8 inches of soil. This means that if stinkweed seeds are buried to a depth of three inches or more by ploughing, they will lie there until turned up again. Therefore in the case of weed seeds of this nature, only very shallow surface cultivation should be done. Again it is noticed that wild oats will come through 5 inches of soil.

The whole question is based on two facts, namely, that seeds must have air and they must have moisture before they will grow. If seeds are too near the surface where the soil is dry they cannot germinate. Neither will they germinate if so deep into the soil that they have insufficient air.

Much could be written along this line, but to do in the study of problems like this is to get out on the level, as about and find the state of cultivation your soil is in, and find the depth of the dry soil on top. No weeds in that dry surface will grow. If the top three inches is dry it means that we will get no germination of stinkweed, false flax, tumbling mustard, pepper grass, etc. Weed seeds in the lumps and clods of earth over the field will not grow. These are the little things that mean success or failure in weed control.

SOW CLEAN SEED

IMPORTANCE OF SHEEP ON THE FARM AS AN AID IN WEED CONTROL.

It is generally conceded that sheep are very useful in combating weeds and the following selections from Bulletin 12 issued by the Ottawa Department of Agriculture are worthy of special notice in that connection.

"The variety loving habits of sheep in the matter of diet render them very useful in destroying weeds that give trouble in grain growing. It is a well known fact that the sheep-raising farmers have the cleanest as well as the richest farms. It is calculated that fully 90% of the troublesome weeds are readily eaten by sheep and these include practically all the weeds that demand special attention. If allowed to act as scavengers sheep will render excellent service in the work of cleaning up permanent pastures, private roads, fence borders and other out of the way places, and if turned on stubble following a grain crop many late seeding plants will be nipped off and turned into mutton. Realising that the broad statement that sheep consume a large percentage of farm weeds is not very convincing, the department consulted a large number of prominent sheep men and the following are a few of the replies:

"H. Arkell, Arkell, Ont.—Sheep eat 90% of the weeds that grow. They are fond of the following: Wild mustard, cockle, ragweed, red roots, *sow thistle* and *Canada thistle* when it is young and tender."

"J. W. Clark, Cainsville, Ont.—As weed exterminators sheep have no equal. They are very fond of *perennial sow thistle*. While going through the province on institute work, many farmers have claimed that sheep would completely eradicate their most troublesome weeds in pasture lands, keeping them so closely cropped that they could not exist for any length of time."

"A. D. Gamley, Griswold, Man.—I might say that in one or two years when wheat was being docked two to five and even seven bushels to the load I was shipping my own wheat from Martinville and had grade certificates coming back marked no dockage. One per cent. was the highest I ever was docked. My summerfallow would be from 40 to 70 acres in extent and I had at times 175 to 240 head, including lambs, feeding upon it. There is not the slightest doubt that if a farm is fenced so that sheep can be put just where wanted they cannot be beaten for ridding a farm of weeds and I think that they and the growing of barley are the only solution to the wild oat problem."

"Richard Gibson, Delaware, Ont.—I believe sheep would eradicate wild mustard if used intelligently for that purpose. They eat it readily when young and again in blossom."

It is fitting to say here that the Saskatchewan Sheep Breeders' Association have formulated a policy whereby high grade sheep will be supplied to Saskatchewan farmers at a very reasonable price per head and interested parties are requested to write to: The Secretary, Saskatchewan Sheep Breeders' Association, Department of Agriculture, Regina.

FENCING.

The three maxims of successful grain growing are "clean seed," "good cultivation" and "fenced fields" and when Russian thistle once obtains a foothold in a district the greatest of these is fenced fields. In the case of this single weed, Russian thistle, some farmers in the southern part of the province this year lost twice the price of a good fence where the weed is coming in, and we are glad to say that most of our country is as yet clean of this weed. No man can afford not to fence because the coming of this weed on a man's farm means that a greater amount of cultivation will soon be necessary and the returns will be greatly diminished. This means loss at both ends. A good fence will help to keep the weeds off. When they once obtain a foothold, there is little encouragement in combating the weeds unless the farm is fenced.

Fencing that is fencing is an expensive business in Saskatchewan and few farmers can afford it during their pioneer experience. But as soon as possible the foundation for a good woven wire fence eight or nine strands high, with durable, substantial posts, should be laid by starting with the outer or line fences, even though only the corner, anchor and gate posts can be properly and permanently placed, with the balance filled in with cheaper stuff. Possibly for the time being, two or three strands of the horrible barbed wire may be made to do and some of it may be used later to put on top of the woven wire. But get started fencing *right*, somehow doing a little at spare intervals every year, and it is surprising how soon a nice system of convenient, satisfactory fields can be laid out.

GOPHERS.

Three species of *spermophilus*, known as gophers or ground squirrels, are found in the province, one of them being striped and the other two gray in colour. In some years, especially dry seasons, they are very abundant and do considerable damage to the crops in thinly settled districts. Every spring numerous letters are received by the department relating to gophers, letters complaining as to the quality of poison supplied by drug stores, about the impossibility of poisoning gophers, condemning some of the new patent poisons, etc.

The whole trouble is due to lack of information as to how to prepare poisons and also carelessness as to the time the work is done.

The proper time to put out the poison is early in the spring when the gophers are just coming out. One day spent then is worth two weeks later in the season when the numbers have increased by breeding. Early in the spring food is scarce and the gopher will eat anything. He will even eat other dead gophers. Later in the season, food is plentiful and the gopher is more particular what he eats, so that when the poison is put out late in the season, as it too often is, aside from the fact that there are 5 to 7 times as many gophers to poison, a smaller percentage of gophers will eat the preparation. Another advantage in doing the work early is that fewer birds will be killed than is the case when the poison is put out late. Directions for preparing the poison are given below.

STRYCHNINE POISON.

Dissolve one and a half ounces of strychnine sulphate in a quart of hot water, add a quart of molasses and a tablespoonful of oil of anise. Thoroughly heat and mix the liquid. While hot pour it over a bushel of clean wheat and mix completely in a tight vessel. Then mix in a few pounds of shorts, to take up the moisture and adhere to the grain. Let it stand over night and then distribute about a tablespoonful in a hole.

This bushel of poisoned mixture will cost less than a dollar, and will be more effective than \$25 worth of some of the patent mixtures at present on the market. Prepare this poison when the snow begins to melt and have it ready for distribution when the gophers first appear.

SMUT.

It may be considered safe and profitable to make a rule that no grain should be sown on the farm without first being treated for the prevention of smut. The loss from this fungus growth in the plant is seldom realised by the grain growers, but its decrease of the yield alone is well worth considering as, in an exceptional case, even 90 per cent. of smutty heads have been recorded in a wheat plot. Even a small quantity of smut in a load of grain reduces its value greatly and prevents ready sale. The preventive treatment is quite simple and should not be neglected. Blue-stone has been largely used for wheat with satisfactory results and formalin is highly recommended for use on all grains, but care should be taken that the latter chemical is of standard 40 per cent. strength.

Dissolve one pound bluestone (copper sulphate) in hot water and add water to the extent of 5 or 6 gallons. The wheat may be dipped in this or merely sprinkled and mixed so that it be all thoroughly dampened. Formalin solution is used at a strength of 1 pound (16 fluid ounces) to from 32 to 40 gallons of water, it being sufficient in the case of wheat to dip or sprinkle, but oats require to be soaked from 5 to 10 minutes. Grain should be covered and left in a pile for an hour or so after being treated, but should be sown within 24 hours.

Further information as to smut may be found in Bulletin No. 2, which may be had on application to the Department.

PRECAUTION FOR THE AVOIDANCE OF SMUT.

- Use plump seed of good vitality.
- Use seed as free from smut as possible to procure.
- Fan thoroughly to remove light seed and smut balls.
- Treat it with blue stone or formalin.
- Burn the stubble of the previous crop if it was smutty.
- Do not sow earlier than the first of April, nor unnecessarily deep.
- Do not pickle wheat in cold water.

POTATO SCAB.

This disease is recognised at sight, by the scabby appearance of the skin of the potato; sometimes only in spots, but in the most serious cases covering the entire surface of the potato. It may be prevented by soaking the seed potatoes for an hour and a half in a corrosive sublimate solution, $2\frac{1}{4}$ ounces dissolved in two gallons of hot water and diluted in 13 gallons of water. Use a wooden tub and handle the potatoes in sacks. Formalin is also used for the same purpose, $\frac{1}{2}$ pint of formalin to 15 gallons of water, the potatoes being soaked two hours and then dried. Land on which clean potatoes or on which no potatoes have been grown should be chosen for the crop. The practice of rotation of crops is a sure preventive.

NOXIOUS INSECTS.

Insects that bite or nibble the plants they attack, as potato beetles, flea beetles, red turnip beetles, poplar beetles and other similar kinds of caterpillars may be destroyed by means of poisonous substances placed on the plants they attack.

Of these poisons the one most commonly used is Paris green, either dry or in the form of a liquid spray, which is prepared by mixing $\frac{1}{4}$ pound Paris green, $\frac{1}{4}$ lime and 50 gallons water. *First make part of the Paris green into a paste with some warm water, add the balance and then pour in the lime after having slaked it in a little water.*

The dry mixture is made by mixing one pound of Paris green with about 50 pounds of flour, fine wood ashes or air slaked lime. This preparation should be dusted over the affected plants if possible when the dew is on them. This may be readily done by placing the mixture in a small muslin or a cheese cloth sack; the sack is then tied to the end of a short stick and held at a convenient height over the plant. When tapped with a light stick a small quantity of the powder is deposited on the plants to be protected.

White hellebore can be used more safely than the above. It is very suitable for some of the leaf eating insects that attack small fruits, particularly the caterpillars of the currant saw-fly. It can be applied as a dry powder or as a liquid mixture in the proportion of 1 ounce to 2 gallons of water.

Some insects (bugs, plant-lice, etc.,) suck the juices of the plants by means of a sharp beak which is driven into the tissues, thus making ineffectual any poison placed on the surface of the leaves. For these it is necessary to resort to external applications which will kill the insects by mere contact with their bodies. These act on the breathing organs of the insect, and one of the most useful is the kerosene emulsion. The Rily Hubbard formula, which is the one almost universally adopted, is as follows:

Kerosene (coal oil)	2 gallons
Rain water (hard water will do)	1 gallon
Soap	$\frac{1}{2}$ pound

Dissolve soap in water by boiling, take from fire, and while hot, turn in kerosene and churn briskly for 5 minutes. To be diluted before using in 9 parts of water, making the mixture up to 12 gallons.

Pyrethrum or insect powder, if fresh, is very good for use on food plants and is not poisonous to men or beasts. It is very effective for nearly all caterpillars and especially for those of the cabbage butterfly, if mixed with four times its weight of flour and kept in a tightly closed vessel for twenty-four hours. It can also be mixed with water in the proportion of 1 ounce to 2 gallons, and in this way is destructive of plant-lice.

PREVENTIVE MEASURES.

The gathering together and burning in the fall of all rubbish about gardens will have a very good effect by destroying any young caterpillars and also preventing cutworm, moths, etc., from laying their eggs. Burning of stubble in the fall is a very good practice, too, as innumerable insects will be destroyed, and it is also well to burn screenings and refuse after threshing. In this way, pupæ of Hessian fly and larvæ of other wheat flies will be disposed of.

Deep ploughing late in the fall will expose to the weather many insects and will bury others in the egg or more advanced stages.

Carbolic acid as a wash has been recommended by several authorities as being of service to protect radishes, onions, etc., from maggots. This is prepared by adding 2 quarts of soft soap to 2 gallons of water into which when boiling 1 pint of crude carbolic acid is turned. Dilute with 50 parts of water and sprinkle on the plants as soon as they are above ground.

Young plants of cabbage, tomatoes, etc., may be protected from cutworms by placing bands of stiff paper or tin about them.

Rotation of crops is desirable when fields are affected.

There are some grubs known as wire worms, the larvæ of click beetles, that are very destructive to crops on new lands in some districts and can only be controlled by cultural methods. The eggs are laid about the roots of grass and weeds in summer and most of the species spend two years in the larval form, being then yellowish brown grubs, tough and shining. They pupate in the ground and although they are mature beetles about August many of them remain in their cells in the ground through the winter. When sod land is broken the wireworms feed that season mostly on the old grass and roots, and those of full growth do no further harm, but those in the first year of growth attack the farmers' first crop because it is all they have to feed on. Flax, barley and rye are said to be less liable to attack than other grains and might therefore be sown in preference to wheat and the land fall ploughed immediately after harvest when the pupæ and beetles would to a large extent be destroyed. Farmers in some parts have had good results by following this ploughing after harrowing by a later ploughing just before winter.

In case of any occurrence of injurious insects, it will be advisable for farmers to send specimens, with an account of the injuries to the College of Agriculture, Saskatoon, addressed to Prof. T. N. Willing.

CUTWORMS.

The poisoned bran remedy is often recommended but under field conditions there are too many worms and too little bran to make this method look feasible.

Clean, tidy, up-to-date farming is the real remedy for cutworms and where this does not effect a cure try growing winter rye which will be too rank and woody by the end of May or first of June to prove attractive to the young worms.

"The Noxious Weeds Problem"

SUMMARY OF AN ADDRESS BY HON. W. R. MOTHERWELL BEFORE THE ANNUAL CONVENTION OF RURAL MUNICIPALITIES, REGINA, MARCH 9, 1916.

"If you want a thing done right, do it yourself." The man who relies upon the weed inspector to clean his land is liable soon to have no land to clean. Every farmer must be weed inspector and weed eradicator for himself. There is no magic about controlling weeds, no royal road to follow in killing them. The process is both laborious and costly. "In the sweat of thy face shalt thou eat bread" applies as truly to the prairie farmer who permits weeds to infest his fields as it did to the father of the human race when he started "back to the land." The seed of noxious weeds which is returned to the land is a menace until it loses its ability to grow, or until it grows, when it must be killed before it ripens seed if further trouble is to be averted. This destruction of seeds and plants cannot be done without cost in labour and without losing crops while cleaning the land.

Tendency to put Weeds Problem up to Government.

These two truths must be emphasised—that there is a right way to control and kill weeds, and that the main responsibility for doing this rests with the man who is farming the land. There is too much tendency to expect the state as represented by the federal, provincial and municipal governments to intervene in the matter of weed control. Some good people would have the government take the initiative in this matter and the governments do, indeed, do much.

What Dominion does.

For instance, let me refer to the work of the federal government through its seed commissioner whose influence is "positive" rather than "negative" through his endeavours to encourage the use of clean seed. He, also, exerts a restraining influence on those who sell seed containing noxious impurities. His influence is also educative, in that splendid bulletins dealing with noxious weeds are published and distributed by his office.

What Provincial Government does.

Likewise the provincial government through their weed commissioners and inspectors endeavour to cause a better enforcement of The Noxious Weeds Act, a better knowledge of noxious weeds and a more general practice of good farming methods. Bulletins are also issued under the auspices of provincial authorities dealing with the noxious weeds problem. The agricultural colleges maintained and supported by provincial governments work ceaselessly to ascertain the methods of farming which will best control noxious weeds and solve the other problems of our agriculture.

What Municipalities do.

Our municipal organisations are also more or less actively engaged in this problem. They are all required by law to engage weed inspectors, and their inspectors are required under penalty to perform certain duties. Many municipalities have even gone further and engaged special men to act in a special capacity as agricultural secretaries. And while many municipalities have shown by their generous support of these agricultural secretaries that they are keenly alive to the necessity of spending their revenue for the promotion of the interests of better farming there are people who think that our municipalities as a whole should do more than they have done just as there are others who think that the provincial government should appoint all weed inspectors and administer The Weeds Act in its entirety.

Every Farmer his own Weed Inspector.

But, let me emphasise again with all the force possible and as clearly as the English language will express it, the fact that no government whether federal, provincial or municipal, can effectively control noxious weeds until the man who grows weeds and thereby loses money sees that he himself must in the last analysis be his own weed inspector and weed eradicator. What would be thought of the man who though suffering from smallpox or other serious disease would neglect to have treatment until ordered by the government to take care of himself? What would be thought of a farmer who would allow the gophers to eat up his grain because the municipality did not order him to poison them? And what must we think of the man who indifferently allows noxious weeds to occupy 5, 10, 20 per cent. of his land, crowding out the same per cent. of his crop and cutting his revenue accordingly? No, Mr. Chairman, this is less, far less, a question of governmental responsibility than of individual responsibility—the responsibility of the man who is growing crops, and until he recognises it in its true aspect the noxious weeds problem will still be unsolved.

Councillors have the responsibility to educate.

But while this is so, and the responsibility of municipal councils is well recognised, I wish at this point to suggest that there is a responsibility resting upon councillors to perform a further service by helping indifferent farmers to see the true situation. Careless farmers must face the facts. They must wake up. Councillors can assist by arranging with the agricultural college to hold meetings to discuss weed problems; by distributing bulletins; by supporting the agricultural society in its work; by helping the grain growers' associations to hold standing crop competitions and seed grain fairs; and by no means last, by encouraging the teachers in rural schools to know noxious weeds, to teach noxious weeds and to have the children know, look for, and collect noxious weeds.

Work in Public Schools:

Wonderful results were obtained in 1915 by Mr. J. M. Pratt, agricultural secretary in Lost River Municipality, through competitions for the boys and girls in the public schools of that municipality in gathering and identifying noxious weeds, and in reporting neatly and accurately the

exact places where each was found. Through these competitions parents as well as children added greatly to their knowledge of noxious weeds.

Knowledge of weed loss should dispel indifference.

While too many of our farmers apparently are indifferent regarding the prevalence of weeds, it must be assumed that their indifference is due largely to want of information regarding the immense loss which they cause. But there is not sufficient excuse for this. The records of Western grain graded "rejected" because of weed seeds tells the story. The farmer grows, cuts, binds, threshes, ships and pays freight on an immense quantity of seeds for which he gets less than no return—it is a bill of expense. A bulletin of the Dominion seed commissioner clearly furnishes additional evidence on this point, and if there be need to confirm these facts, we have the evidence of what we see all about us. And summing these up, I concluded last harvest that the farmers of this province lost \$25,000,000 in 1915 through noxious weeds. Now surely, Mr. Chairman, evidence of this great loss is all that is needed to awaken the man whose revenue is being stolen from him by the weeds while he sleeps. And armed with this information cannot our councillors assist in sounding the alarm and calling indifferent farmers to action?

Western Agriculture favours weeds.

Our Canadian West is one of the worst countries in the world for weeds. Our system of continual and almost exclusive grain growing favours weeds. The marvellously rich clay soil produces them abundantly. Our climate, dry and generally cool in the fall of the year, prevents the germination in the fall of seeds and the growth of weeds which the winter's frosts should kill. The windy days and the drifting of weed infested summerfallows transports weed seeds to clean farms. And our worst weeds ripen early and shed their seed on the ground to blight succeeding crops and decrease the farmer's revenues.

The fight is on.

Weed control and weed eradication are not mere terms. They represent a serious task, stern enough to challenge the energies, the patience and the resources of any man. But the man who is alert to the danger and loss, who knows the enemy and the best mode of attack, will launch the offensive of his own accord, without waiting for an order from the weed inspector. There is no need to wait until the weeds are in control.

Expedients.

We should begin at once to reconstruct our prairie agriculture. We cannot make a clean sweep all at once, but we can at least begin to control weeds by summerfallowing every third year; by using clean seed; by harrowing grain in its early stages with a light drag harrow just as the weeds begin to appear, and preferably on a bright warm day; by growing such crops as winter rye for the eradication of wild oats; and by cultivating only as much land as we have power to work properly; and by doing uniformly good workmanship in all parts of our field activities.

The real solution.

It is not possible under our present agricultural system to banish weeds entirely from Saskatchewan. But our system of agriculture will change under the pressure of economic necessity. Our farms will some day be smaller and better worked, our fields will be fenced. More live stock will be kept. A greater variety of crops will be grown. Then the prosperous farmers will become more prosperous, while the poor farmers will either become better farmers or drift into other occupations or situations. The last great West will steadily become more like the older provinces and states. And when these changes are brought about the noxious weeds problem will not any longer be a serious one. In the older provinces and states this result is seen. In the older farming districts, in Great Britain and the Continent we have a basis for comparison. There, land is too valuable to grow weeds and this fact mainly explains the changed conditions regarding freedom from weeds. Weed laws did not do it. Weed inspectors were not responsible for it. Economic laws did it and they when fully recognised will cause equally important improvements here. Indeed, evidences of change here are even now apparent. The growing interest in dairying and live stock farming proclaims it.

What Government and Municipalities in co-operation can do.

I wonder, Mr. Chairman, if I may mention one or two ways in which the rural municipalities and the government might co-operate to promote the change which is inevitable? I do not think it is necessary at this time to mention the many ways in which the Saskatchewan Government has endeavoured to promote "better farming" and the interests of Saskatchewan farmers. To touch upon Co-operative Creameries, Live Stock Distribution Policy and the others would take too much time. I have already referred to the ready response of many municipalities to the suggestion of spending a sum of money for the support of agricultural secretaries. I overlooked saying that at least twenty appointed agricultural secretaries for 1916 and one municipality, I am informed, has appointed a man at a salary of \$2,000 per annum. I realise, however, that many others did not continue to appoint agricultural secretaries. I also realise that it is a very difficult matter to find men who combine the high qualifications needed to carry on this kind of work successfully and when they are found they must have the sympathy, the co-operation and the support not only of the council but primarily and essentially of the ratepayers. The ready response of our municipalities and the large number of appointments the first year surprised us and shows us that some action is desired, but I fear that the difficulty of finding the needed type of man will militate against the extension of the agricultural secretary system as at first proposed.

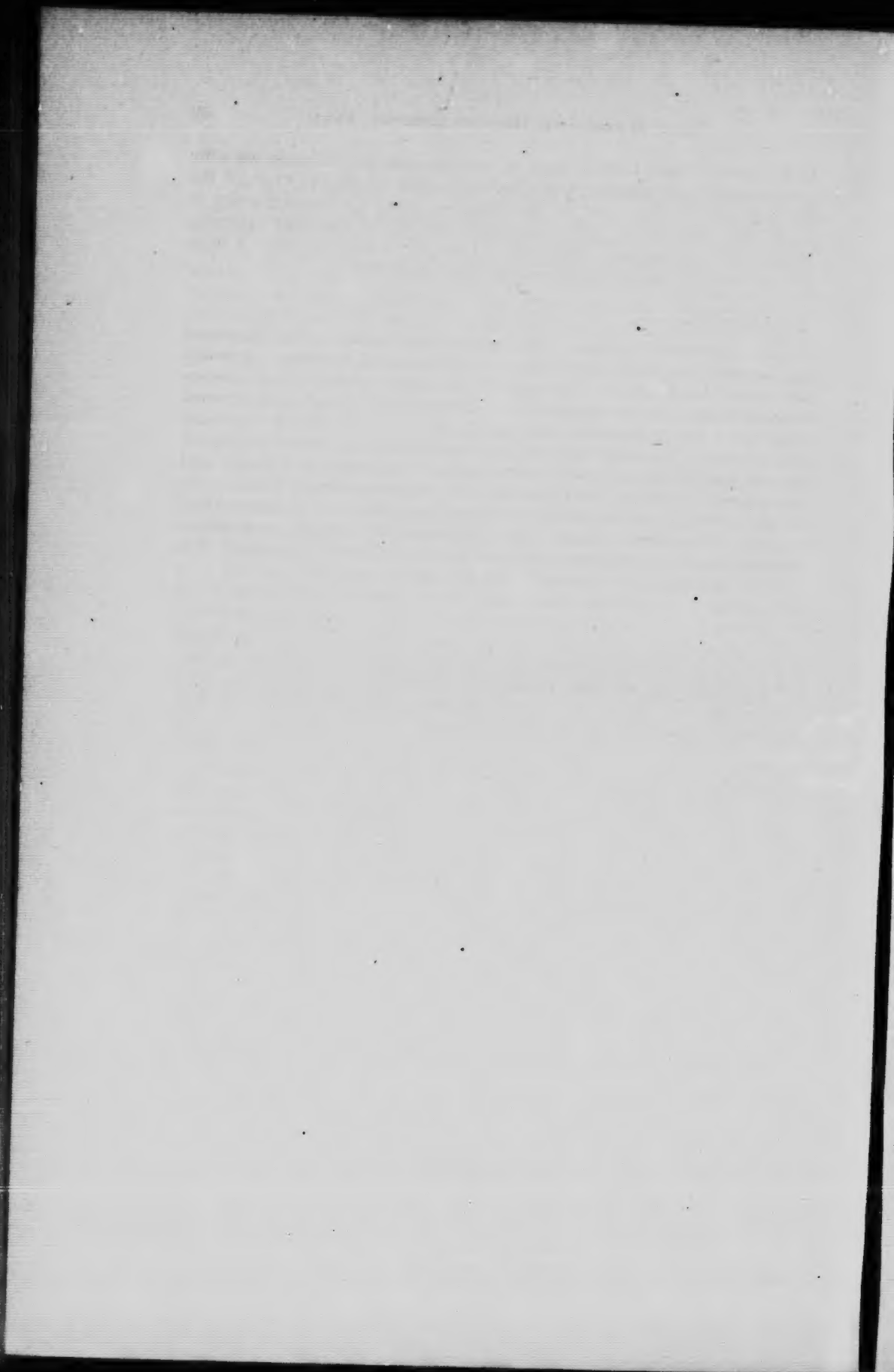
District Representatives.

I wish to say, Mr. Chairman, that for a short time we have been working through district representatives in the western portion of the province and while the war has, only temporarily we hope, taken three of our four representatives, I believe that this line of work can be carried on jointly by the provincial government and the municipalities. I do not wish to commit the government in any way to a rapid extension of the system, as the difficulty of getting the highest type of men will also

be felt here. But, I think, that an arrangement can be made whereby the provincial government would be responsible for the selection of the men and the payment of their salaries while the municipalities in which they work could jointly contribute enough for travelling expenses, office help, printing and stationery. This is one way in which I hope the government and the municipalities can co-operate.

Agricultural Societies.

Another matter is that of the agricultural society. The Municipal Act permits the payment of grants to agricultural societies. I would like to see this widened. The agricultural society should be on a better financial basis. At its organisation there should be enough capital raised either by a life membership fund or otherwise to start the society right and afterward the municipal and government grants should with good management make administration easy and satisfactory. Cities and towns have "boards of trade" to promote their interests. What better "board of trade" can a rural municipality have than a live agricultural society? Therefore, I believe, Mr. Chairman, that closer co-operation between the rural municipalities and the government in support of a "district representative service" and our agricultural societies will help immeasurably in solving this noxious weeds problem by bringing in an era of better farming, thus preparing the day for the inevitable introduction of greater diversification in our farming methods. But let me repeat and emphasise again that weeds will thrive in spite of all that can be done by governments, whether Dominion, provincial, or municipal, until farmers generally learn that they themselves must individually do their own weed inspecting and weed eradicating.



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